Original Article / Özgün Makale

MEDICINE PALLIATIVE CARE

DOI: 10.47582/jompac.1102420

J Med Palliat Care 2022; 3(2): 87-91

Is it possible to treat night eating disorder and sleep quality with surgery? Benefits of obesity surgery

Gece yeme bozukluğu ve uyku kalitesini ameliyat ile tedavi etmek mümkün mü? Obezite cerrahisinin faydaları

Ferhat Çay[1], Merve Şahin Can[2]

[1]Balıkesir University, Faculty of Medicine, Department of General Surgery, Balıkesir, Turkey
[2]Balıkesir University, Faculty of Medicine, Department of Pscyhiatry, Balıkesir, Turkey

Cite this article as/Bu makaleye atıf için: Çay F, Şahin Can M, et al. Is it possible to treat night eating disorder and sleep quality with surgery? Benefits of obesity surgery. J Med Palliat Care 2022; 3(2): 87-91.

ABSTRACT

Aim: This study was conducted to assess sleep quality and night eating syndrome in patients with morbid obesity after bariatric surgery.

Material and Method: Patients with morbid obesity who underwent sleeve gastrectomy were evaluated. The preoperative and postoperative values of Body Mass Index (BMI), Hamilton Rating Scale for Depression (HAM-D), Hamilton Anxiety Rating Scale (HAM-A), Night Eating Questionnaire (NEQ), Pittsburgh Sleep Quality Index (PSQI), and Berlin Sleep Questionnaire (BSQ) were compared.

Results: A total of 82 surgery candidates who were aged between 18 and 65 (36.36±10.37) were planned for bariatric surgery participated in our study. We completed our study with 77 patients since 5 of the patients did not come to their postoperative 6th-month controls for various reasons. Standard psychiatric examinations of the candidates were performed before and after the surgery, and their written consent was obtained after they had been informed about the study. Mean preoperative BMI value was found as 44.53±4.33, HAM-A value as 4.96±6.14, HAM-D value as 3.82±3.84, PSQI value as 4.69±3.64, and NEQ score as 15.94±7.94. In the 6th month evaluations after surgery, the mean BMI value was found as 30.74±3.55, HAM-A value as 2.39±3.47, HAM-D value as 1.57±2.39, PSQI value as 1.48±1.42, and NEQ score as 5.58±3.06. The mean EWL value was found as 61.71±10.58.

Conclusion: In conclusion, morbid obesity may cause anxiety, depression, and night eating syndrome and may impair sleep quality in parallel to them. We observed that these clinical conditions improved after bariatric surgery.

Keywords: Bariatric surgery, sleep, night eating syndrome

ÖZ

Amaç: Bu çalışma, bariatrik cerrahi sonrası morbid obezitesi olan hastalarda uyku kalitesi ve gece yeme sendromunun değerlendirilmesi amacıyla yapılmıştır.

Gereç ve Yöntem: Morbid obezitesi olan ve tüp mide ameliyatı yapılan hastalar değerlendirildi. Vücut Kitle İndeksi (BKİ), Hamilton Depresyon Derecelendirme Ölçeği (HAM-D), Hamilton Anksiyete Derecelendirme Ölçeği (HAM-A), Gece Yeme Anketi (NEQ), Pittsburgh Uyku Kalitesi İndeksi (PSQI) ve ameliyat öncesi ve sonrası değerleri Berlin Uyku Anketi (BSQ) karşılaştırıldı.

Bulgular: Çalışmamıza 18-65 yaşları arasında (36,36±10,37) obezite cerrahisi planlanan toplam 82 cerrahi adayı katıldı. Hastalardan 5'i ameliyat sonrası 6. ay kontrollerine çeşitli nedenlerle gelmediği için 77 hasta ile çalışmamızı tamamladık. Adayların ameliyat öncesi ve sonrası standart psikiyatrik muayeneleri yapıldı ve çalışma hakkında bilgilendirildikten sonra yazılı onamları alındı. Ameliyat öncesi ortalama VKİ değeri 44,53±4,33, HAM-A değeri 4,96±6,14, HAM-D değeri 3,82±3,84, PUKİ değeri 4,69±3,64 ve NEQ puanı 15,94±7,94 olarak bulundu. Ameliyat sonrası 6. ay değerlendirmelerinde ortalama VKİ değeri 30,74±3,55, HAM-A değeri 2,39±3,47, HAM-D değeri 1,57±2,39, PUKİ değeri 1,48±1,42 ve NEQ puanı 5,58±5 olarak bulundu. 3.06. Ortalama EWL değeri 61,71±10,58 olarak bulundu.

Sonuç: Sonuç olarak, morbid obezite anksiyete, depresyon ve gece yeme sendromuna neden olabilir ve bunlara paralel olarak uyku kalitesini bozabilir. Bariatrik cerrahi sonrası bu klinik durumların düzeldiğini gözlemledik.

Anahtar Kelimeler: Uyku, gece yeme sendromu, obezite cerrahisi

Corresponding Author/Sorumlu Yazar: Ferhat Çay, Balıkesir University, Faculty of Medicine, Department of General Surgery, Balıkesir, Turkey
E-mail/E-posta: cayferhat@gmail.com
Received/Geliş: 12.04.2022 **Accepted/Kabul:** 04.05.2022

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INTRODUCTION

The increase in the prevalence of obesity has brought on many comorbid conditions. Bariatric surgery draws attention as an effective treatment method both in the world and our country since the desired results cannot be achieved in obesity with traditional methods and more effective results are obtained in a short time with this surgery (1,2). Bariatric surgery methods are administered to individuals with a body mass index (BMI) of ≥40 kg/m^2 or those with comorbid diseases, such as hypertension, diabetes, sleep apnea, and a BMI of ≥35 kg/m^2 (3,4). Weight loss after bariatric surgery provides a clinical improvement in many comorbid diseases existing before surgery.

When the effects of sleep on food consumption are considered, the mutual relationship between sleep disorders and obesity gains importance 2. Poor quality sleep and reduced sleep duration contribute to the development and progression of obesity 3. In return, obesity can cause some physical and mental symptoms that may impair sleep quality. Some of these conditions include obstructive sleep apnea syndrome (OSAS), anxiety disorders, and mood disorders (5). Obesity is one of the most common known risk factors in the etiology of OSAS. In most cases, bariatric surgery and the resulting dramatic weight loss provide an improvement in sleep disturbance and OSAS (6,7). In addition, it has been reported that weight loss after bariatric surgery contributes positively to sleep quality regardless of whether it is accompanied by OSAS (7). Disordered sleep is the DSM-5 diagnostic criteria for both anxiety disorders and depressive disorders, and it reduces the quality of life of the patients. Weight loss after bariatric surgery does not only improve sleep quality physiologically but also provides positive effects by contributing to the reduction of psychiatric complaints (8). Another issue that is emphasized in the relationship between sleep and obesity is eating habits. It has been shown that after surgery, eating disorders can improve, eating attitudes can change positively, and preoccupations with weight and body can decrease (9). In this context, night sleep problems and night eating syndrome following excessive eating in the evening can be considered as another condition that may impair sleep quality in people with obesity clinically.

In this study, it was aimed to determine sleep disturbance in individuals with obesity, identify risk factors that may be clinically relevant, and investigate the effect of surgery on sleep quality.

MATERIAL AND METHOD

This study was started after the ethical approval of the study was obtained from Balıkesir University Faculty of Medicine Clinical Researches Ethics Committee (Date: 14.04.2021, Decision No: 2021-106). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

A total of 82 surgery candidates who were between 18 and 65 years old, were admitted to General Surgery outpatient clinic, and were planned for bariatric surgery evaluated in our study. We completed our study with 77 patients (since 5 of the patients did not come to their postoperative 6th-month controls for various reasons). Psychiatric examinations of the candidates were performed before the surgery by a psychiatrist, and then their written informed consent was obtained after they had been informed about the study. Following these procedures, a socio-demographic data form, which was created by us, the Hamilton Anxiety Rating Scale (HAM-A), the Hamilton Rating Scale for Depression (HAM-D), the Night Eating Questionnaire (NEQ), the Pittsburgh Sleep Quality Index (PSQI), and the Berlin Sleep Questionnaire (BSQ) were applied to the candidates. Psychiatric evaluations of the patients were done again in the 6th month after surgery, and the scales were re-administered.

The Sociodemographic Data Form

This form, which was prepared by the researcher, included questions about the candidates' background and their medical information, such as age, gender, height/weight, previous psychiatric illness, chronic illness, and medications used.

The Hamilton Rating Scale for Depression (HAM-D)

It consists of 17 items questioning the symptoms of depression in the last week. The highest score on the scale is 53. The interpretation of the scores is as follows: 0-7, no depression; 8-13, mild depression; 14-18, moderate depression; 19-22, severe depression; and 23 and higher, very severe depression. The Turkish validity and reliability study of the scale was conducted by Akdemir et al. (10).

The Hamilton Anxiety Rating Scale (HAM-A)

It consists of 14 items used to evaluate the somatic and psychic symptoms of anxiety. Each item is scored between 0 and 4 points according to the severity of the symptom. The scores are interpreted as follows: 0-5, normal; 6-14, mild; 15 and higher, severe anxiety. The Turkish reliability and validity study of the scale was conducted by Yazıcı et al. (11).

The Night Eating Questionnaire (NEQ)

The original scale was developed by Allison and collegues for determining the risk of night eating syndrome (12). The questions on the questionnaire are scored between 0 and 4 using a five-point Likert-type scoring system. Total scores on the questionnaire range between 0-52. The cut-off score was stated as 25 in the original study, and a score of 18 and higher was considered clinically significant in the Turkish validity study (13).

The Pittsburgh Sleep Quality Index (PSQI)
This scale was developed by Buysse et al. (14) to assess subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleeping pills, and impairment in daytime work. Each response is scored between 0-3 according to the frequency of the symptom. The global score varies between 0-21, and high values indicate poor sleep quality and high levels of sleep disturbance. A global score of 5 and higher indicates that the clinical sleep quality is significantly poor. The PSQI was adapted to Turkish patients by Agargün et al. (15).

The Berlin Sleep Questionnaire (BSQ)
The BSQ is a questionnaire designed for OSAS population surveys. It consists of 10 questions in 3 categories in total. A score of ≥2 points in categories 1 and 2 and a score of ≥1 point in category 3 are considered significant. Each category is evaluated within itself, and if 2 or more categories are positive, the risk of OSAS is considered high (16).

Statistical Analysis
The NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) software was used for statistical analysis. While evaluating the study data, descriptive statistical methods (mean, standard deviation, median, frequency, ratio, and minimum and maximum values) were employed, and the distribution of the data was evaluated with the Shapiro-Wilk Test. The Mann-Whitney U test was used to compare quantitative data in groups of two. Wilcoxon rank test was used for comparisons of two periods. Chi-square analysis was used to determine the relationship between qualitative data. Quantative data were given as median ± standart deviation (minimum - maximum)(median), and categorical data were indicated in count (n) and percentages (%). Significance was evaluated at $p<0.01$ and $p<0.05$ levels.

RESULTS

The ages of the patients in our study ranged from 20 to 61, with the mean age being 36.36±10.37 years. Of the participants, 74% (n=57) were female, and 26% (n=20) were male.

In the preoperative evaluations of the participants, the mean value of Body Mass Index (BMI) was found as 44.53±4.33, the Hamilton Anxiety Rating Scale (HAM-A) as 4.96±6.14, the Hamilton Rating Scale for Depression (HAM-D) as 3.82±3.84, the Pittsburgh Sleep Quality Index (PSQI) as 4.69±3.64, and the Night Eating Questionnaire score (NEQ) as 15.94±7.94. On the other hand, the mean postoperative values of the participants were found as follows: BMI, 30.74±3.55; HAM-A, 2.39±3.47; HAM-D, 1.57±2.39; PSQI, 1.48±1.42; and NEQ, 5.58±3.06. The mean EWL value was 61.71±10.58, which supports the success of the surgery. The evaluations of the participants according to BSQ in terms of risk for OSAS indicated that 37 (48.1%) patients had no risk, but that the remaining 40 (51.9%) were in the risk group. It was observed that the risk continued in only 2 of the participants (2.6%) after the surgery.

The participants were divided into two subgroups according to their pre-surgical sleep quality to evaluate the factors affecting their sleep quality. Thirty-two patients (41.5%) who scored 5 or higher from the Pitsburgh Sleep Quality Index were included in the group with poor sleep quality, and forty-five patients (58.5%) with a score of less than 5 were placed in the group with good sleep quality. There was no statistically significant difference between the groups in terms of age and gender ($p=0.225$; $p=0.669$). Patients with poor sleep quality had significantly higher BMI, HAM-A, HAM-D, and NEQ scores compared to the group with good sleep quality. ($p=0.001$; $p<0.05$). Factors that might have affected the participants' sleep quality before surgery are shown in **Table 1**.

Table 1. Comparison of preoperative measurements by sleep status

		n	Mean±Sd	Min.-Max. (Median)	p
Age	PSQI<5	45	37.42±11.05	20-61 (35)	0.226
	PSQI>5	32	34.88±9.29	24-53 (30.5)	
Preop BMI	PSQI<5	45	42.89±2.46	40.39-50.78 (42.28)	0.001**
	PSQI>5	32	46.93±5.31	40.39-58.87 (46.31)	
Ham-A	PSQI<5	45	2.93±3.28	0-14 (2)	0.001**
	PSQI>5	32	7.81±7.93	0-33 (6)	
Ham-D	PSQI<5	45	2.93±3.32	0-11 (2)	0.009**
	PSQI>5	32	5.06±4.21	0-21 (4.5)	
NEQ	PSQI<5	45	13±5.91	5-29 (12)	0.001**
	PSQI>5	32	20.06±8.66	3-34 (20.5)	

Mann Whitney U Test; *p<0.05; **p<0.01

The comparison of the pre-and post-operative scale scores of the participants with good and poor sleep quality is given in **Tables 2 and 3**. There was a statistically significant decrease in scale scores in both groups postoperatively.

Table 2. Comparison of the pre-and post-operative scale scores of the patients with good sleep quality

		Preoperative Measurement	Postoperative Measurement	p
BMI	Mean±Sd Min.-Max. (Median)	42.89±2.46 40.39-50.78 (42.28)	29.65±2.55 26.71-40.39 (28.8)	0.001**
HAM-A	Mean±Sd Min.-Max. (Median)	2.93±3.28 0-14 (2)	1.69±2.57 0-9 (0)	0.001**
HAM-D	Mean±Sd Min.-Max. (Median)	2.93±3.32 0-11 (2)	1.13±1.79 0-8 (1)	0.001**
NEQ	Mean±Sd Min.-Max. (Median)	13±5.91 5-29 (12)	5.29±2.5 1-12 (5)	0.001**

Wilcoxon Rank Test; *p<0.05; **p<0.01

Table 3. Comparison of the pre-and post-operative scale scores of the patients with poor sleep quality

		Preoperative Measurement	Postoperative Measurement	P
BMI	Mean±Sd Min.-Max. (Median)	46.93±5.31 40.39-58.87 (46.31)	32.33±4.21 26.42-40.39 (31.44)	0.001**
Ham-A	Mean±Sd Min.-Max. (Median)	7.81±7.93 0-33 (6)	3.38±4.29 0-15 (1.5)	0.001**
Ham-D	Mean±Sd Min.-Max. (Median)	5.06±4.21 0-21 (4.5)	2.19±2.97 0-12 (1)	0.001**
NEQ	Mean±Sd Min.-Max. (Median)	20.06±8.66 3-34 (20.5)	6±3.72 1-16 (5)	0.001**

Wilcoxon Test; *p<0.05; **p<0.01

DISCUSSION

Many different clinical conditions impair sleep quality. Obesity causes psychiatric situations such as mood disorders and anxiety disorders, which makes it important to determine both physiological and psychological aspects of sleep disorders caused by obesity (17). It is expected that bariatric surgery will improve sleep quality by contributing to both areas. As expected, a significant decrease was found in all post-operative psychiatric total scale scores of the participants in our study. This finding is similar to the findings of other studies showing the positive effects of surgery on sleep disorders, anxiety, depression levels, and eating attitudes (8). However, the fact that the presence of severe psychiatric diseases constituted a surgical contraindication in the pre-operative psychiatric evaluation may have supported the efforts of the patients to not report their symptoms during the interview and to show themselves well. This may explain why the preoperative anxiety and depression scale scores were lower compared to the population with obesity who did not apply for surgery, although a significant decrease was determined in the scale scores postoperatively (18).

When evaluated in terms of OSAS, which is one of the most prominent risk factors for sleep quality, 40 out of 77 patients in our study were found at risk. It was observed that the risk continued in only 2 of the participants (2.6%) after the surgery. In the literature, many studies support that bariatric surgery reduces the risk of OSAS 17. In the study of Dileklitaş et al. (19), a significant improvement was found in sleep quality and daytime sleepiness in the 6th month of surgery, and it was reported that there was a decrease in the risk for OSAS. However, even though it is stated that the risk is reduced, it should also be kept in mind that the Berlin questionnaire is a clinical screening tool for OSAS and that polysomnography is the gold standard for the diagnosis of OSAS.

In our study, 32 (41.5%) of the 77 surgical candidates with obesity were found to have poor quality sleep. Similar to our study, Toor et al. (20) reported deterioration in sleep quality in 78% of bariatric surgery candidates and found a significant increase in sleep quality and sleep duration after surgery. In the 6-month-follow-up study of Ghiasi et al. (21), although an increase in sleep quality and a decrease in daytime sleepiness were determined, the lack of psychiatric evaluation that could affect sleep quality was stated as a limitation of the study. In another study conducted in 2020, a decrease in general sleep quality was found in 65% of bariatric surgery candidates, and clinically significant insomnia findings were found in 35% (22). In our study, increased BMI values and anxiety and depression scores were found to be associated with deterioration in sleep quality. This relationship has been supported by the literature (23).

Another condition that we think may affect sleep quality is night eating syndrome, which is defined as a condition characterized by loss of appetite in the morning, overeating in the evening, and insomnia. Night eating syndrome is defined in oher specified feeding and eating disorder (OSFED) subgroup of eating disorder in DSM-5 and characterized by recurrent episodes of night eating, as manifested by eating after awakening from sleep or by excessive food consumption after the evening meal. The night eating causes significant distress and/or impairment in functioning (24). In night eating syndrome, the biological rhythms of eating and sleep are separated, people's morning eating is suppressed, and their evening and night eating increases. There is a 2 - 6 hours delay between eating and sleep rhythms, which may have consequences that may impair sleep quality (25). In our study, scores on the night eating questionnaire were significantly higher in individuals with poor sleep quality than in individuals who defined their sleep as good. Yeh et al. (26), too, stated that impaired eating attitude contributed to the relationship between decreased sleep quality and weight gain. In surgical candidates with obesity, clinical insomnia and depressive symptoms have been associated with increased daily consumption of junk food, emotional eating, and night-eating behavior (9). In a 6-year follow-up study, it was reported that there was an increase in weight gain and binge eating with the accompanying disinhibited eating behavior in patients with short sleep duration (27). Although we found a significant decrease in scores on the night eating questionnaire in our study, Lawson et al. (28) found the score on the PSQI as 7.58 after bariatric surgery in patients with eating attitude disorder. Poor sleep quality was positively correlated with perceived stress, depression, eating disorder, and night eating in these individuals, and a lower EWL value was found in those with poor sleep quality. The significant decrease observed in postoperative scores in both groups was a finding that supported the effect of bariatric surgery on sleep quality with a decrease in night eating behavior, anxiety, and depression levels. However, the evaluation of sleep disorders and the determination of related factors in individuals with ongoing night-eating syndrome after surgery should be supported by studies.

CONCLUSION

It was observed that morbid obesity might cause anxiety, depression, and night-eating syndrome and that it might impair sleep quality in parallel with them. We observed that these clinical conditions improved after bariatric surgery. We believe that obesity is one of the most important etiological causes of sleep quality disorder, but further studies are needed since there are other causes in the etiology.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was started after the ethical approval of the study was obtained from Balıkesir University Faculty of Medicine Clinical Researches Ethics Committee (Date: 14.04.2021, Decision No: 2021-106).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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